



## BROAD AGENCY ANNOUNCEMENT (BAA)

### **INTRODUCTION:**

This publication constitutes a Broad Agency Announcement (BAA) as contemplated in Federal Acquisition Regulation (FAR) 6.102(d)(2), the Department of Defense Grants and Agreements Regulations (DoDGARS) 22.315(a), and DoD's Other Transaction Guide for Prototypes Projects, USD(AT&L), OT Guide, Jan 2001. A formal Request for Proposals (RFP), other solicitation, or additional information regarding this announcement will not be issued.

The Office of Naval Research (ONR) will not issue paper copies of this announcement. ONR reserves the right to select for award all, some, or none of the proposals in response to this announcement. ONR provides no funding for direct reimbursement of proposal development costs. Technical and cost proposals (or any other material) submitted in response to this BAA will not be returned. It is the policy of ONR to treat all proposals as sensitive competitive information and to disclose their contents only for the purposes of evaluation.

### **I. GENERAL INFORMATION**

#### **1. Agency Name -**

Office of Naval Research  
One Liberty Center  
875 North Randolph Street, Suite 1425  
Arlington, VA 22203-1995

#### **2. Research Opportunity Title -**

Compact Power Conversion Technologies Future Naval Capabilities (FNC) Enabling Capability Project

#### **3. Program Name -**

Compact Power Conversion Technologies

#### **4. Research Opportunity Number -** ONR BAA 08-005

#### **5. Response Date -**

White Papers Due: 21 March 2008  
Proposals Due: 30 May 2008

See Section IV.3. of this BAA for a full listing of due dates.

#### **6. Research Opportunity Description -**

##### **6.a. Background**

The Navy is embarking on the development of Next Generation Integrated Power System (NGIPS) for application on future surface ships and submarines as a means of providing better fuel economy, architectural flexibility and electricity for high energy mission systems. Limited by the shipboard space and weight allocated to power generation, distribution and conversion equipment, the Navy is interested in technology solutions that can cost-effectively increase Power System power density. This BAA seeks efforts to develop electrical power conversion component, subsystem and architectural solutions that align with or enhance the efforts put forth under NGIPS. In addition, consideration will be given for advanced technologies suitable for Navy-after-Next systems where technologies or concepts align with Navy power system development plans beyond NGIPS.

A Medium Voltage DC (6-8kVDC) power architecture will be considered for the technology developed under this BAA. It is anticipated that the details of this architecture and the associated component and subsystem requirements will be developed in parallel with the issuance of this BAA. Key points to consider with regard to NGIPS:

- An open system Technical Architecture will be established which would define the standards one applies to the system
- A System Architecture that meets the requirements of a specific platform will be derived from the more generic Technical Architecture
- Competition will occur at the module level – there will not be a turnkey system purchase
- To ensure competition, the Systems Integrator will not be producing the system components.
- NGIPS is cost-sensitive – It cannot afford to pay a premium for power density at the component level unless it can be shown that this component power density improvement results in the lowest cost ship system solution.
- The Navy wants to accommodate increased system power and energy capacity as needed during the ship's life.

With the introduction of the DDG-1000, the US Navy is developing an Integrated Power System (IPS) that converts all prime power into electricity before allocating this power to propulsion, mission, and ship service loads. For DDG-1000, propulsion is the overwhelming principal consumer of electrical power from IPS. The installed generating capacity of DDG-1000 allows it to power all of its mission loads while it maneuvers at its flank speed. With the advent of high energy weapons and sensors, where the power to operate them is derived electrically and the levels of power they require rival propulsion power at tactical speeds, short term power demands by these systems could greatly exceed the ship's generation capacity. It may not be feasible to have installed generating capacity to allow the ship to simultaneously operate these weapons and sensors at full power while also applying full power to propulsion. Material costs, along with physical space and weight penalties incurred for power generation, conversion and distribution equipment may become prohibitive.

With respect to this power management dilemma, it would be desirable to devise a power distribution system that could quickly and safely direct large quantities of electric power where it is needed - when it is needed - based upon the immediate needs of the ship. This would relax the installed power generation requirements by removing the need for dedicated power generation for each installed high energy load. Installed power generation equipment would then be more optimally configured in terms of its operating duty cycle (duty cycle would increase) and space allocation. IPS power density could be improved further if the power system architecture could minimize the need for dedicated power conversion equipment for each high energy load. This would have the same effect for power conversion equipment as it did for power generation equipment. The overall footprint of installed power conversion equipment would be optimized and its overall operating duty cycle would be increased.

#### **6.b. Program Description**

The objective of the Compact Power Conversion Technologies Enabling Capability (EC) Project is to develop key component and system technologies that align with or enhance the efforts put forth under the NGIPS program. The EC will investigate technology development in three interrelated products considered to be key enablers of this vision: (1) Multifunction Power Converters, (2) Bi-directional Power Control Modules (PCMs), and (3) Power Management Controllers (High Energy Management). The goal would be to push each technology to Technology Readiness Level (TRL) 6. The definition of TRL6 is as follows – “a System/subsystem model or prototype demonstration in a relevant environment. The representative model or prototype system, which is well beyond the breadboard tested for TRL 5, is tested in a relevant environment. This represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a high fidelity laboratory environment or in a simulated operational environment.”

This program is anticipated to be a multi-phased down select effort for each of the individual but interrelated product areas. Phase 1, lasting 6-12 months will focus on analytical models and preliminary design work of proposed equipment or systems and

identify critical factors that would need to be demonstrated to verify feasibility. Phase 2, lasting 12 months, will include reduced scale prototype development and stand alone verification testing focusing on the critical factors established in Phase 1. Scaling will be determined by a combination of cost, funds available, and risk factors to be addressed, but will most likely be done at bus voltages selected by NGIPS. Phase 3, lasting 2 years would produce a full or large scale demonstrator that could be suitable for insertion into a land-based facility for system testing. Multi-function and Bi-directional Converter Products are scheduled to complete Phase 3 at the end of FY11, so that they can be considered for insertion on the CG(X) platform. Power Management Controller products are scheduled to complete Phase 3 in FY12.

### **Multifunction Power Converters**

The first enabling technology under investigation will be Multifunction Power Converters. It is envisioned that power conversion modules (PCMs) rated in excess of 10 MW will become prevalent on more electric ships and submarines. Initially, their application will be for converting the electrical voltage and frequency generated and distributed by the IPS into a format suitable for use in driving large propulsion motors such as what is found on DDG1000. With the introduction of additional high energy loads into the power grid, it is clear that power conversion modules will be needed to perform the same task for these loads. It is imperative that the PCMs designed/built for these loads share some level of commonality with the PCMs used for propulsion where at all practical. At the least, one needs to investigate whether these PCMs can at least share common subassemblies in order to reduce the life cycle costs. At the most, one could investigate the practicality of sharing a common PCM that could time division multiplex its output to two or more loads in an effort to maximize the use of the electrical equipment installed on the ship. Between these extremes, there probably exists a practical solution possible with present/near term technology development.

Aligning with the NGIPS Open Architecture Philosophy, the Multi-functional Power Converter product development effort will need to address the modular aspects of the implementation. The present plan is to have a module interface in which the Government has unlimited rights or that is open source. Adequate specificity will be needed to procure and interconnect these modules in a manner that suits the high power loads connected to the bus. A logical module power rating must be established to best accommodate the assortment of high energy loads. A tradeoff of power density versus equipment commonality amongst the Navy's anticipated high power converter applications would need to be included. An identification of where open-architecture boundaries should be defined within the product would be required. An explicitly defined boundary controlled by the Government needs to be established to account for what must be considered open source (or data in which the Government has unlimited rights) and what could be left as black box components/subsystems developed with private funding. Applications to consider would include the following:

- Propulsion motor drive
- Traditional or high-speed generator mechanical-to-electrical power converter

- Interface to high energy storage module(s)
- Interface to pulsed energy weapon
- Interface to high power sensor
- Ship service or high energy distribution power conversion module

The Navy is interested in understanding the practicality of whether these applications can share a common set of modules for the bulk of the electrical power conversion requirements. This common bulk module must be something that is compatible for both commercial and military products. The bulk converter could then be supplemented, if necessary by custom modules to provide application specific power to a particular load. The goal would be to provide an acquisition program a more cost-effective way of acquiring its power conversion equipment. Once the bulk converter/custom converter development and demonstration have been completed, follow-on acquisition programs would pay for non-recurring engineering to develop their own lower power custom modules as well as the control interface to the bulk converter. The bulk converter itself would be a non-developmental commodity item.

The following are provided as examples of this concept:

- Can the rectification requirements of each generator or high energy load be met with a common set of modules configured to provide the power needed for the application? Variations on output power level are handled by increasing the number of modules or sub-modules for the application. Variations on output waveform requirements for different applications could be handled by an application-specific add-on module.
- Can a common interface be established between various propulsion motor technologies (induction, permanent magnet, superconducting, homopolar) and the power converters that drive them so that new motor developments do not get hampered with the development of an associated drive? Can this interface be established in a manner that does not negate advantages one motor technology might have over another?

The following are areas of technology investment to pursue for this product:

- Advanced circuit topologies that improve upon present topologies in their ability to accommodate the bulk converter/custom converter concept, addressing increased throughput efficiency, power quality, control bandwidth and reliability
- Traditional or new circuit topologies that take advantage of power semiconductor device improvements
- Power converter control methodologies that improve the operation of existing topologies or support bulk converter module to custom converter module interaction
- Affordability through commonality – based upon a review of the candidate power conversion applications to be considered, determine what the proper level of

commonality should be and at what modular level should it be implemented. The goal would be to align the Navy bulk conversion requirements with those of commercial industry.

- Thermal management techniques that increase the total module power density or make the module more compatible with the ship's thermal management infrastructure.

The following set of exit criteria has been established as a measurement of successful transition of this technology:

Attribute/Parameter	Current	Minimum Threshold	Objective
Power Density	1MVA/m <sup>3</sup>	2MVA/m <sup>3</sup>	3MVA/m <sup>3</sup>
Multi-functionality/ Component Commonality	Application specific – single use	Applicable to two high energy loads	Multiple high energy applications
Efficiency	94%	96%	98%
THD %	9%	5%	<1%

Acquisition and/or Life-Cycle Cost will have an impact on transition of this technology.

### **Bi-Directional Power Converters**

The second enabler under investigation will be Bi-Directional Power Conversion Modules capable of achieving 3MW/m<sup>3</sup>. Bi-directional Power Converters with adequate power density will enable the power system to be more flexible in the allocation of energy storage modules, which itself will play a key role in the effectiveness of the overall integrated power system. Bi-directional power conversion would enable energy storage modules to be located more strategically throughout the ship's power system – near power generation sources, near loads that require energy storage, and at various locations within the power distribution network.

Within the present Integrated Fight-Through Power System (IFTP), the Power Conversion Modules employed to distribute electrical power to ship service and mission loads are inherently unidirectional in power flow from the generators down to the loads. Some electrical loads (such as propulsion and other motor actuated ship service/mission loads) have an inherent regenerative energy characteristic that is presently addressed locally by the particular load, typically through resistive energy dissipation. Other loads have or plan to have (example – rail guns) significant amounts of local energy storage that enable them to operate at the repetition rates and power consumption limits imposed upon them by the power distribution system.

An academic challenge problem has been initiated where analysis is requested to determine the most logical arrangement of energy storage throughout the power distribution system. Traditionally, energy storage was provided to overcome two potential power loss scenarios – loss of power generation due to sources dropping offline,

or loss of power due to power distribution system casualties or isolation due to fault clearing. The first scenario can be managed through allocation of energy storage close to the power generation source so that all loads fed from the generator continue to be energized upon loss of the primary power source. The drawback to this location is that it would need to be sized for both vital and non-vital loads with enough hold-up time to start up an alternate generator and enough capacity to provide fault clearing to systems reliant upon circuit breaker time/current curves. The second scenario is typically managed by locating energy storage in close proximity to the vital loads that need to remain energized during power system casualties. By its nature, it resolves both power loss scenarios. The drawback to locating energy storage close to the vital load is that it becomes dedicated to that single purpose of holding up that individual vital load. Since there are a large number of vital loads located throughout the ship, the total accretes to a large amount of energy storage with no means of utilization beyond their primary application.

The introduction of high energy electrical weapons and sensors to the Navy power system will require energy storage to act as the buffer between the system's instantaneous power generation/distribution capabilities and the load's instantaneous power demand, while decoupling electrical power disturbances created by high energy loads from the rest of the power system. If each load that falls into the category of exceeding the instantaneous power generation requirements of the system must provide all of their own energy storage, the total system may become impractical in terms of cost, size and weight. The challenge will be to determine how much energy storage is needed and where should it be located.

If Next-Generation IPS architectures are investigated that conclude there is a benefit to utilizing this regenerative/stored energy, technology development will be required to add bi-directionality to the PCMs affected by this architectural change. Present metrics for bi-directional PCMs would probably fall within 20% of the present uni-directional PCMs. Technology improvements made to uni-directional PCMs are most likely applicable to bi-directional PCMs and therefore the relative power density difference is likely not to change. The present  $1\text{MVA}/\text{m}^3$  for high power unidirectional PCMs would represent the base metric to improve upon for bi-directional converters. A 2x-3x improvement would be the goal of this development effort, exploring paths similar to those outlined for the multifunction PCM listed above. Similarly, harmonic requirements and efficiency improvements would use the same metrics as the multi-function converter development effort (9% THD down to < 1%, 94% efficiency up to 98%).

The following set of exit criteria has been established as a measurement of successful transition of this technology:

<b>Attribute/Parameter</b>	<b>Current</b>	<b>Minimum Threshold</b>	<b>Objective</b>
Power Density	1MVA/ m <sup>3</sup>	2MVA/m <sup>3</sup>	3MVA/m <sup>3</sup>
Bi-directional Power Flow	Not available	Yes, at TBD power levels and rates of	Yes, at TBD power levels and rates of

		application	application
Efficiency	94%	96%	98%
THD %	9%	5%	<1%

At this phase, it is unknown at what power levels and rates of application one would need to be able to change the direction of power flow within the converter. This should be investigated as part of this BAA product effort or as part of the Power Management Controller Product described below. Acquisition and/or Life-Cycle Cost will have an impact on transition of this technology.

### **Power Management Controllers**

The third enabler under investigation would be the development of Advanced High Power Management Controller methods that would enable the effective management of the installed power generated and distributed throughout the ship. Once effective component solutions have been created to provide multi-functionality and bi-directional power flow, effective power management methods will need to be employed to utilize these capabilities. The present generation Integrated Power System found on DDG1000 needs to contend with only a single high energy load (propulsion). Its power generation capacity allows it to operate at full propulsion power while operating all of its mission loads at their highest power consumption. Next generation ships with multiple high energy loads may not have enough installed generation to operate in a similar manner. As such, new methods of power management must be developed that allow the electrical power to quickly be channeled from one load to another to meet the ship's real time mission power demands.

It is envisioned that two power ramp rates would be quantifiable commodities that would describe the power system. One would be the ramp rate capability of the installed power generators. This would be a relatively slow value (~1MW/sec) governed by how quickly prime movers such as gas turbines can be brought from low to high power. Prime mover fuel control loops would drive this ramp rate. A second, much faster ramp rate would be governed by the distribution infrastructure itself to allow power to flow from one high energy load to another in a quick, yet stable manner. From the perspective of the power generation plant, no change in load demand would be seen, only the ultimate destination of the power would change. The distribution architecture selected, the level of electromechanical and solid state converter based infrastructure, the protection scheme employed, the level of energy storage available, the level of power grid stability and power quality one can live with will all drive this second power ramp rate. The distribution ramp rate may need to be controlled either through establishment of ramp rate limits that loads can draw or through active control via the distribution components itself. In addition to trying to meet these difficult power management requirements, the goal would also be to ensure that the system devised is also configured to allow the ship to operate reliably and efficiently across the full range of the ship's electric power consumption profiles in all of its operational states.



The effort under this investigation here would look at architectural concepts, control methods, protection schemes, communication requirements, stability factors and analyses which can first establish what can be done with a present integrated power system and what would need to be done when additional high energy loads are introduced onto the ship's power grid. Next it would need to establish ways such loads can be managed to effectively meet the ship's operational requirements while minimizing the cost, size and weight impact of the power system infrastructure one would need to operate such a system. A set of power system metrics relevant to power management and a roadmap of how and when the capabilities are introduced would need to be created. Besides establishment of ramp rates, MIL-1399-like interface information would need to be provided for the loads, including a plan to deal with bi-directional power flow and regenerative energy.

The following set of exit criteria has been established as a measurement of successful transition of this technology:

<b>Attribute/Parameter</b>	<b>Current</b>	<b>Minimum Threshold</b>	<b>Objective</b>
Power Ramp Rate from one High Power load to next	N/A	TBD MW/s	TBD MW/s
High Power Load accommodation	Single High Power Load (propulsion)	Two high energy loads	Multiple high energy loads
Throughput Efficiency from generation to loads in major operating scenarios	??%	TBD%	TBD%

At this phase, it is unknown at what power rates of application one would need to manage. Similarly, IPS baseline throughput efficiency must be established for the major operational configurations envisioned so that threshold and objective metrics can be pursued. This should be investigated as part of this BAA product effort. Acquisition and/or Life-Cycle Cost will have an impact on transition of this technology.

#### **6.c. Additional Guidance**

The U.S. Navy is looking for affordable solutions and is trying to change the present paradigm of having to use expensive, Navy-unique hardware and software. Offerors must be aware of state-of-the-art developments and employ commercial-off-the-shelf (COTS) technology to the greatest extent possible. Whenever known, Offerors should address the needs for militarizing COTS. Business case analyses should be provided with increased fidelity at each phase of the effort.

#### **7. Point(s) of Contact -**

Questions of a technical nature shall be directed to the cognizant Technical Point of Contact, as specified below:

Science and Technology Point of Contact:

Mr. Joseph Borraccini  
Program Officer  
Office of Naval Research,  
Ships and Ship Systems Division, ONR 331  
One Liberty Center, Room 665  
875 N. Randolph St.  
Arlington, VA 22203-5660  
Tel: (703) 696-7823 (VA office)/(215)-897-8797 (PA Office)  
Fax: (703) 696-0308 (VA Office)/215-897-8380 (PA Office)  
E-mail: [joseph.borraccini@navy.mil](mailto:joseph.borraccini@navy.mil)

Questions of a business nature shall be directed to the cognizant Contract Specialist, as specified below:

**Business Point of Contact:**

Mr. Joseph Pletscher (CACI)  
Contract Specialist  
Office of Naval Research  
875 N. Randolph St., Code 254  
Arlington, VA 22203-1995  
Tel: (703) 588-2435  
E-mail: [joseph.pletscher.ctr@navy.mil](mailto:joseph.pletscher.ctr@navy.mil)

**8. Instrument Type(s) -**

It is anticipated that awards may take the form of contracts, grants, cooperative agreements, and other transaction agreements, as appropriate.

**9. Catalog of Federal Domestic Assistance (CFDA) Numbers -**

12.300

**10. Catalog of Federal Domestic Assistance (CFDA) Titles -**

Basic and Applied Scientific Research (DOD)

**11. Additional Information -**

N/A

**II. AWARD INFORMATION**

**Total Amount of Funding the Program Office expects to Award through the Announcement:**

Although subject to official fiscal appropriations, it is anticipated that the Compact Power Conversion Technologies Future Naval Capabilities (FNC) Enabling Capability Program will be funded at a level of \$2.5M-\$6M/year for the period FY08 - FY12. The total funding for all three product areas is approximately \$22M.

**Anticipated Number of Awards:**

ONR anticipates a phased development approach with three awards for each product area in Phase I. It is anticipated that one to two Phase II efforts will be funded, and a single Phase III effort for each product area.

**Anticipated Award Types:**

Awards will primarily be in the form of Cost-Plus-Fixed-Fee (CPFF), Indefinite Delivery, Indefinite Quantity (IDIQ) contracts. However the Government reserves the right to award grants, Cooperative Agreements (CAs), or Other Transaction Agreements (OTAs) to appropriate parties should the situation warrant use of a non-contractual instrument.

**Expected Amounts of Individual Awards:**

The Compact Power Conversion Technologies Future Naval Capabilities (FNC) Enabling Capability Project will be funded with Exploratory Development and Advanced Technology Development funds (Budget Activities 6.2 and 6.3). Task Order awards for each product area will typically be in the range from \$200,000 to \$500,000 for Phase I efforts, \$800,000 to \$1,500,000 for Phase II, and \$2,500,000 to \$5,000,000 for Phase III although lower and higher cost proposals will be considered. Phase II and Phase III efforts will be issued as separate task orders. Phase I proposal shall include ROM estimates of Phase II and III costs. Near the end of each previous Phase, updated follow-on Phase cost estimates will be required for evaluation prior to selection for follow-on tasking.

**Anticipated Start Dates and/or Periods of Performance for New Awards and Renewals:**

Multifunction and Bidirectional Converter Products period of performance is FY08 through FY11. Power Management Controller Product period of performance is FY08-FY12. Proposed work should be structured to have a Task Order 1 effort (Phase I) period of performance of 6 months or less for the Multifunction Power Converter and the Bidirectional Power Converter, and 18 months or less for the Power Management Controller. ONR has previously funded related technology development with other Budget Activity funding. Proposals that build on current or previous DoD work are encouraged. If you are extending work performed under other ONR or DoD projects, clearly identify the point of departure and what existing work will be brought forward and what new work will be performed under this BAA.

**III. ELIGIBILITY INFORMATION**

All responsible sources from academia and industry may submit proposals under this BAA. Although foreign owned entities are eligible to submit white papers or proposals under this BAA, it should be noted that as these products mature, some of the applications of this technology development may eventually become subject to restrictions under the International Traffic in Arms Regulation (ITAR). Historically Black Colleges and Universities (HBCUs) and Minority Institutions (MIs) are encouraged to submit proposals and join others in submitting proposals. However, no

portion of this BAA will be set aside for HBCU and MI participations. Federally Funded Research & Development Centers (FFRDCs), including Department of Energy National Laboratories, are not eligible to receive awards under this BAA. However, teaming arrangements between FFRDCs and eligible principal bidders are allowed so long as they are permitted under the sponsoring agreement between the Government and the Specific FFRDC.

Navy laboratories and warfare centers as well as other Department of Defense and civilian agency laboratories are not eligible to receive awards under this BAA and should not directly submit either white papers or full proposals in response to this BAA. If any such organization is interested in one or more of the programs described herein, the organization should contact an appropriate ONR POC to discuss its area of interest. The various scientific divisions of ONR are identified at <http://www.onr.navy.mil/>. As with FFRDCs, these types of federal organizations may team with other responsible sources from academia and industry that are submitting proposals under this BAA.

Teams are encouraged to submit proposals in any and all areas. However, Offerors must be willing to cooperate and exchange software, data and other information in an integrated program with other contractors, as well as with system integrators, selected by ONR.

#### **IV. APPLICATION AND SUBMISSION INFORMATION**

##### **1. Application and Submission Process -**

White Papers are required prior to submitting a Full Proposal - The due date for White Papers is no later than 2:00 P.M. (Local Eastern Time) on 21 March 2008. Initial Navy evaluations of the White Papers will be issued via e-mail notification on or about 14 April 2008. Detailed technical and cost proposals will be subsequently encouraged from those Offerors whose proposed technologies have been identified through the above-referenced e-mail as being of "particular value" to the Navy. However, any such encouragement does not assure a subsequent award. Technical and Cost Proposals may also be submitted by any Offeror whose white paper was not identified as being of particular value to the Navy. But the initial white paper appraisal is intended to give companies a sense of whether their concepts are likely to be funded under this BAA. Full Proposals will not be considered under this BAA unless a white paper was received on or before the white paper due date specified above.

Full Proposals - The due date for receipt of Full Proposals is 2:00 P.M. (Local Eastern Time) on 30 May 2008. It is anticipated that initial selections will be made by 13 June 2008. As soon as the final proposal evaluation process is completed, the Offeror will be notified via email of its selection or non-selection for an award. Proposals exceeding the page limit may not be evaluated.

##### **2. Content and Format of White Papers/Full Proposals -**

White Papers and Full Proposals submitted under the BAA are expected to be unclassified; however, confidential/classified proposals are permitted. If a classified proposal is submitted, the resultant contract will be unclassified.

Unclassified proposals shall be submitted directly to the Technical Point of Contract (TPOC). An 'unclassified' Statement of Work (SOW) must accompany any classified proposal.

Classified proposals shall be submitted directly to the attention of ONR's Document Control Unit at the following address:

Office of Naval Research  
Document Control Unit  
ONR Code 43  
875 North Randolph Street  
Arlington, VA 22203-1995

The inner wrapper of the classified proposal should be addressed to the attention of the TPOC.

Proposal submissions will be protected from unauthorized disclosure in accordance with FAR Subpart 15.207, applicable law, and DoD/DoN regulations. Offerors are expected to appropriately mark each page of their submission that contains proprietary information. The proposal shall include a severable, self-standing Statement of Work, which contains only unclassified information and does not include any proprietary restrictions.

The proposal format and content identified below are applicable to the submission of proposals for contracts, cooperative agreements and other transactions. As noted in Paragraph 5 below, proposals selecting grant awards are to be formatted as required by Standard Form 424 (R&R), which is available via the internet at <http://www.grants.gov/>.

Offerors may propose in one or multiple product areas. Offerors proposing in multiple product areas should provide one comprehensive proposal addressing each product area being proposed, but should note below the differing page restrictions related to proposing multiple product areas.

### **White Paper Format**

Paper Size – 8.5 x 11 inch paper

- Margins – 1" inch
- Spacing – single or double-spaced
- Font – Times New Roman, 12 point
- Number of Pages – No more than 10 single-sided pages for a white paper addressing a single product area, 15 single-sided pages for a white paper addressing two product areas, and 20 single-sided pages for a white paper addressing all three product areas (excluding cover page, table of contents, resumes, and the cost summary). White Papers exceeding the page limit may not be evaluated.
- Copies – one (1) original, three (3) copies, and one electronic copy on a CD-ROM (in Microsoft® Word or Excel 97 or 2003 compatible version or PDF format).

### **White Paper Content**

- Cover Page – The Cover Page shall be labeled “PROPOSAL WHITE PAPER,” and shall include the BAA number, proposed title, Offeror’s administrative and technical points of contact, with telephone numbers, facsimile numbers, and Internet and email addresses, and shall be signed by an authorized officer.
- Abstract – A very brief description of the technology including goals and objectives, and technology areas to be addressed.
- Technical Concept – A description of the technology innovation addressed (described in Section 1, paragraph 6) and technical risk areas. Include a detailed listing of the technical tasks/subtasks organized by year. Relate the product that results from the task/subtask, and briefly state metrics that will be met as a result of the task/subtask. In presenting the technical concept, the offer should explain how the technology proposed is relevant to the operational context.
- Deliverables – A list of any deliverables for the effort, including, but not limited to, hardware, technical reports, presentation material, specific demonstration tests, and monthly and final reports with the approximate date of expected delivery.
- Past History - Include a short history of any previous work conducted in specific or related areas, including related major contract actions.
- Costs – A one-page summary of costs segregated by tasks, by quarter, and by government fiscal year for the Phase I effort. A Rough Order of Magnitude (ROM) for the Phase II and III efforts.
- Management Plan - Short resumes of the principal investigators and descriptions of partnering arrangements.

### **Full Proposal Format – Volume 1 - Technical and Volume 2 - Cost Proposal**

- Paper Size – 8.5 x 11 inch paper
- Margins – 1” inch
- Spacing – single or double-spaced
- Font – Times New Roman, 12 point
- Number of Pages – Volume 1 is limited to no more than 50 single-sided pages for a proposal addressing a single product area, 60 single-sided pages for a proposal addressing two product areas, and 70 single-sided pages for a proposal addressing all three product areas. Volume 2 has no page limitations. The cover page, table of contents, and resumes are excluded from the page limitations. Full Proposals exceeding the page limit may not be evaluated.
- Copies – one (1) original, three (3) copies and one electronic copy on a CD-ROM (in Microsoft® Word or Excel compatible or PDF format).

### **Full Proposal Content**

#### **Volume 1: Technical Proposal**

Volume 1 of the Full Proposal shall include the following sections.

- **Cover Page:** This should include the words “Technical Proposal” and the following:
  - 1) BAA number;
  - 2) Title of Proposal;

- 3) Identity of prime Offeror and complete list of subcontractors, if applicable;
- 4) Technical contact (name, address, phone/fax, electronic mail address);
- 5) Administrative/business contact (name, address, phone/fax, electronic mail address);  
and,
- 6) Duration of effort (separately identify the basic effort and any options).

- **Table of Contents:**

- **Executive Summary:** Summarize the technology you are proposing and the expected improvements to the Navy.
- **Concept of Operation for the Navy:** A summary of the way in which the proposal's product(s) would support the Navy in an operational context. Include quantitative specifications for how the products will improve operational performance.
- **Technical Concept:** Include thorough description of the proposed technology innovation and relevant technical risk areas. This section should detail the S&T challenges, the plan to address the challenges, and the resultant benefits of performing this effort.
- **Statement of Work:** A Statement of Work (SOW) clearly detailing the scope and objectives of the effort and the technical approach. It is anticipated that the proposed SOW will be incorporated as an attachment to the resultant award instrument. To this end, the proposed SOW must be a severable self-standing SOW without any proprietary restrictions, which can be attached to the contract or agreement award. Include a detailed listing of the technical tasks/subtasks organized by year.
- **Project Schedule and Milestones:** A summary of the schedule of events and milestones.
- **Assertion of Data Rights:** For a contract award an Offeror may provide with its proposal assertions to restrict use, release or disclosure of data and/or computer software that will be provided in the course of contract performance. The rules governing these assertions are prescribed in Defense Federal Acquisition Regulation Supplement (DFARS) clauses 252.227-7013, -7014 and -7017. These clauses may be accessed at the following web address:

<http://farsite.hill.af.mil/VFDFARA.HTM>

The Government may challenge assertions that are provided in improper format or that do not properly acknowledge earlier federal funding of related research by the Offeror.

- **Deliverables:** A list of any deliverables for the effort, including, but not limited to, hardware, technical reports, presentation material, specific demonstration tests, and monthly and final reports with the approximate date of expected delivery.
- **Operational Utility:** A detailed plan for assessing the operational utility of the key products of this effort during a Fleet or Marine operational exercise, including proposed metrics.
- **Qualifications:** A discussion of previous accomplishments and work in this, or closely related, areas, and the qualifications of the investigators. Key personnel resumes shall be attached to the proposal and will not count toward the page limitations.
- **Management Approach:** A discussion of the overall approach to the management of this effort, including brief discussions of the total organization, use of personnel,

project/function/subcontractor relationships, government research interfaces, and planning, scheduling and control practice. Identify which personnel and subcontractors (if any) will be involved. Include a description of the facilities that are required for the proposed effort with a description of any Government Furnished Equipment/Hardware/Software/Information required, by version and/or configuration.

## **VOLUME 2: Cost Proposal**

The Cost Proposal shall consist of a cover page and two parts, Part 1 and Part 2. Part 1 will provide a detailed cost breakdown of all costs by cost category by calendar or fiscal year and Part 2 will provide a Cost breakdown by task/sub-task using the same task numbers in the Statement of Work. Options must be separately priced.

**Cover Page:** The use of the SF 1411 is optional. The words “Cost Proposal” should appear on the cover page in addition to the following information:

- BAA number;
- Title of Proposal;
- Identity of prime Offeror and complete list of subcontractors, if applicable;
- Technical contact (name, address, phone/fax, electronic mail address)
- Administrative/business contact (name, address, phone/fax, electronic mail address) and;
- Duration of effort (separately price out the basic effort and any options).
- Summary of proposed costs

**Part 1:** Detailed breakdown of all costs by cost category by calendar or fiscal year for the Phase I effort:

- Direct Labor – Individual labor category or person, with associated labor hours and unburdened direct labor rates;
- Indirect Costs – Fringe Benefits, Overhead, G&A, COM, etc. (Must show base amount and rate);
- Proposed contractor acquired equipment such as computer hardware for proposed research projects should be specifically itemized with costs or estimated costs. An explanation of any estimating factors, including their derivation and application, shall be provided. Where possible, indicate purchasing method (competition, price comparison, market review, etc.);
- Travel – Number of trips, destinations, durations, etc.;
- Subcontract – A cost proposal as detailed as the Offeror’s cost proposal will be required to be submitted by the subcontractor. The subcontractor’s cost proposal can be provided in a sealed envelope with the Offeror’s cost proposal or will be obtained from the subcontractor prior to contract award;
- Consultant – Provide consultant agreement or other document which verifies the proposed loaded daily/hourly rate;
- Materials should be specifically itemized with costs or estimated costs. Where possible, indicate purchasing method, (competition, engineering estimate, market survey, etc.);
- Other Directs Costs, particularly any proposed items of equipment or facilities. Equipment and facilities generally must be furnished by the contractor/recipient.



Justifications must be provided when Government funding for such items is sought; and,

- Fee/Profit including fee percentage (contract proposals only)
- Phases II & III – Provide Rough Order of Magnitude (ROM) cost estimates for Phases II & III.

**Part 2:** Cost breakdown by task/sub task corresponding to the same task numbers (or work breakdown structure) in the Statement of Work. When options are contemplated, options must be separately identified and priced by task/sub-task corresponding to the same task numbers in the Statement of Work.

### 3. Significant Dates and Times -

Anticipated Schedule of Events		
Event	Date	Time (Local Eastern Time)
White Papers Due Date	21 March 2008	2:00 pm
Notification of interest in White Paper*	14 April 2008	N.A.
Full Proposals Due Date	30 May 2008	2:00 pm
Notification of Selection for Award*	13 June 2008	N.A.
Contract Awards*	01 September 2008	N.A.

\* These dates are estimates as of the date of this announcement.

N.A. = Not applicable.

**NOTE: Due to changes in security procedures since September 11, 2001, the time required for hard-copy written materials to be received at the Office of Naval Research has increased. Thus it is recommended that any hard-copy proposal be mailed several days before the deadline established in the solicitation so that it will not be received late and thus be ineligible for award consideration.**

### 4. Submission of Late Proposals –

Any proposal, modification, or revision, that is received at the designated Government office after the exact time specified for receipt of proposals is “late” and will not be considered unless it is received before award is made, the contracting officer determines that accepting the late proposal would not unduly delay the acquisition AND:

- If it was transmitted through an electronic commerce method authorized by the announcement, it was received at the initial point of entry to the Government infrastructure not later than 5:00 P.M. one working day prior to the date specified for receipt of proposals; or
- There is acceptable evidence to establish that it was received at the Government installation designated for receipt of proposals and was under the Government’s control prior to the time set for receipt of proposals; or
- It was the only proposal received.

However, a late modification of an otherwise timely and successful proposal, that makes its terms more favorable to the Government, will be considered at any time it is received and may be accepted.

Acceptable evidence to establish the time or receipt at the Government installation includes the time/date stamp of that installation on the proposal wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

If an emergency or unanticipated event interrupts normal Government processes so that proposals cannot be received at the Government office designated for receipt of proposals by the exact time specified in the announcement, and urgent Government requirements preclude amendment of the announcement closing date, the time specified for receipt of proposals will be deemed to be extended to the same time of day specified in the announcement on the first work day on which normal Government processes resume. The contracting officer must promptly notify any offeror if its proposal, modifications, or revision was received late, and must inform the offeror whether its proposal will be considered.

#### **5. Submission of Grant Proposals to Grants.gov (NOT APPLICABLE TO PROPOSALS FOR CONTRACTS OR OTHER TRANSACTION AGREEMENTS)**

Grant Proposals may be submitted through Grants.gov or by hard copy. Regardless of whether Grants.gov is used or "hardcopy" submission, the offeror must use the Grants.gov forms from the application package template associated with the BAA on the Grants.gov website. To be considered for award, applicants must include the ONR Department Code in Block 4 entitled 'Federal Identifier' of the Standard Form (SF) 424 R&R. **Please be sure to enter the Department Code that best relates to your proposal in Block 4 (Federal Identifier) of the SF 424 R&R to ensure that it is properly routed to the correct Program Office (by completing Blocks 18 and 19 the Grant Applicant will also be providing the certification on lobbying required by 32 CFR Part 28. Refer to Section VI, 'Award Administration Information' entitled "Certifications" for further information). Only one Department Code may be selected.** Please choose at the sub-Department level wherever possible (i.e., for parent ONR Code 30, you should select at the 301, 302 or 303 level if possible). A list of the Department Codes can be found at <http://www.onr.navy.mil/> on the right side of the screen. Applicants who fail to provide a Department Code identifier will receive notification that their proposal submission has been rejected. However, White Papers should not be submitted through the Grants.govApply process but rather be sent directly to ONR. White paper submissions may be either mailed, faxed, or emailed directly to the appropriate ONR Program Officer/Program Manager.

For electronic submission of grant full proposals, there are several one-time actions that must be completed in order to submit an application through Grants.gov (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the

Central Contract Registry (CCR), register with the credential provider, and register with Grants.gov). See [www.grants.gov](http://www.grants.gov), specifically [www.grants.gov/GetStarted](http://www.grants.gov/GetStarted).

Use the Grants.gov Organization Registration Checklist at [http://www.grants.gov/applicants/register\\_your\\_organization.jsp](http://www.grants.gov/applicants/register_your_organization.jsp) which will provide guidance through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called 'MPIN' are important steps in the CCR registration process. Applicants who are not registered with CCR and Grants.gov should allow at least 21 days to complete these requirements. It is suggested that the process be started as soon as possible. Additionally, in order to download the application package, applicants will need to install PureEdgeViewer. This small, free program will allow applicants to access, complete and submit applications electronically and securely. For a free version of the software, visit the following website: [www.grants.gov/DownloadViewer](http://www.grants.gov/DownloadViewer). Any questions that may arise relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or [support@grants.gov](mailto:support@grants.gov).

**Detailed instructions entitled "Grants.Gov Electronic Application and Submission Information" on how to submit a Grant proposal through Grants.gov may be found at the ONR website listed under the 'Acquisition Department – Contracts & Grants Submitting a Proposal' link at: [http://www.onr.navy.mil/02/how\\_to.asp](http://www.onr.navy.mil/02/how_to.asp)**

#### **6. Addresses for the Submission of White Papers and Full Proposals –**

White papers and Full Proposals should be sent to the technical point of contact listed above in section I.7.

**NOTE: PROPOSALS SENT BY FAX OR E-MAIL WILL NOT BE CONSIDERED.**

### **V. EVALUATION INFORMATION**

#### **1. Evaluation Criteria –**

Award decisions will be based on a competitive selection of proposals resulting from a scientific, management and cost review. Evaluations will be conducted using the following evaluation criteria.

##### **A. Overall scientific and technical merits of the proposal**

1. The degree of innovation;
2. Ability to meet desired performance metrics;
3. Degree of ability to achieve TRL 6 at conclusion of program;
4. Cost of proposed end solutions based on tradeoff of component commonality among multiple applications versus non-recurring engineering costs to develop individual product for each application;
5. Any new Life Cycle cost factors (such as periodic maintenance and obsolescence management) that need to be considered upon introduction of the new technology into fleet application;

6. The soundness of technical concept; and,
  7. The Offeror's awareness of the state of the art and understanding of the scope of the problem and the technical effort needed to address it.
- B. Offeror's capabilities, related experience, and past performance, including the qualifications, capabilities and experience of the proposed principal investigator and personnel.
1. The quality of technical personnel proposed;
  2. The Offeror's experience and past performance in relevant efforts with similar resources; and,
  3. The ability to manage the proposed effort.
  4. The Offeror's experience in transitioning power conversion technologies to a military product, as well as to commercial customers.
- C. Potential naval relevance and contributions of the effort to the agency's specific mission.
- D. The realism of the proposed schedule
- E. The realism of the proposed cost and total amount.

White papers and full proposals will be evaluated based upon Criteria A through E. Criteria A through E are of equal weight. The subcriteria under any particular criterion are of equal weight.

For proposed awards to be made as contracts to large businesses and non-profits, the socio-economic merits of each proposal will be evaluated based on the extent of the Offeror's commitment in providing meaningful subcontracting opportunities for small businesses, small disadvantaged businesses, woman-owned small businesses, HUBZone small businesses, veteran-owned small businesses, service disabled veteran-owned small businesses, historically black colleges and universities, and minority institutions.

Industry-Academia Partnering – ONR highly encourages partnering between industry and academia with a view toward speeding the incorporation of new science and technology into fielded systems. Proposals that utilize industry-academic partnering which enhances the development of novel S&T advances will be given favorable consideration.

Industry-Government Partnering – ONR highly encourages partnering between industry and Government with a view toward speeding the incorporation of new science and technology into fielded systems. Proposals that utilize industry-Government partnering

which enhances the development of novel S&T advances will be given favorable consideration.

## **2. Evaluation Panel -**

White papers and technical and cost proposals submitted under this BAA will be protected from unauthorized disclosure in accordance with FAR 3.104-5 and 15.207. The cognizant program officer and other Government scientific experts will perform the evaluation of white papers and technical proposals. Restrictive notices notwithstanding, one or more support contractors may be utilized as subject-matter-expert technical consultants. Similarly, support contractors may be utilized to evaluate cost proposals. However, proposal selection and award decisions are solely the responsibility of Government personnel. Each support contractor's employee having access to technical and cost proposals submitted in response to this BAA will be required to sign a non-disclosure statement prior to receipt of any proposal submissions.

## **VI. AWARD ADMINISTRATION INFORMATION**

### **1. Administrative Requirements –**

- The North American Industry Classification System (NAICS) code – The North American Industry Classification System (NAICS) code for this announcement is 541712 with a small business size standard of 500 employees.
- CCR - Successful Offerors not already registered in the Central Contractor Registry (CCR) will be required to register in CCR prior to award of any grant, contract, cooperative agreement, or other transaction agreement. Information on CCR registration is available at <http://www.ccr.gov> or by calling 1-888-227-2423.
- Certifications – Proposals for contracts and assistance agreements should be accompanied by a completed certification package which can be accessed on the ONR Home Page at Contracts & Grants located at [http://www.onr.navy.mil/02/rep\\_cert.asp](http://www.onr.navy.mil/02/rep_cert.asp).

#### Contracts:

For contracts, in accordance with FAR 4.1201, prospective contractors shall complete and submit electronic annual representations and certifications at <http://orca.bpn.gov>. In addition to completing the Online Representations and Certifications Application (ORCA), proposals must be accompanied with a completed DFARS and contract specific representations and certifications. These "DFARS and Contract Specific Representations and Certifications", i.e., Section K, may be accessed under the Contracts and Grants Section of the ONR Home Page at [http://www.onr.navy.mil/02/rep\\_cert.asp](http://www.onr.navy.mil/02/rep_cert.asp). This requirement is also applicable for other transaction proposals involving prototypes (Section 845 agreements).

#### Assistance Agreements:

For grant proposals and proposals for cooperative agreements or other transaction agreements (other than for prototypes), the certification package is entitled, [Certifications for Grants and Agreements](#).

Grant awards greater than \$100,000 require a certification of compliance with a national policy mandate concerning lobbying. Grant and other assistance applicants may provide this certification in one of three (3) ways:

- 1) By signing and submitting the Standard Form (SF) 424 (R&R) as a part of a hard copy the grant proposal submission (complete Blocks 18 and 19);
- 2) By electronic submission of SF424 (R&R) as a part of an electronic proposal submitted via Grants.gov (complete Blocks 18 and 19); or
- 3) By hard copy submission of the full text lobbying certification found at [http://www.onr.navy.mil/02/rep\\_cert.asp](http://www.onr.navy.mil/02/rep_cert.asp).

The following certification applies to each applicant seeking federal assistance funds exceeding \$100,000:

### **CERTIFICATION REGARDING LOBBYING ACTIVITIES**

(1) No Federal appropriated funds have been paid or will be paid by or on behalf of the applicant, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the Federal contract, grant, loan, or cooperative agreement, the applicant shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The applicant shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title 31, U.S.C. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

- Subcontracting Plans - Successful contract proposals that exceed \$500,000, submitted by all but small business concerns, will be required to submit a Small Business Subcontracting Plan in accordance with FAR 52.219-9, prior to award.

## **VII. OTHER INFORMATION**

### **1. Government Property, Government Furnished Equipment (GFE) and Facilities**

Each Offeror must provide a very specific description of any equipment/hardware that it needs to acquire to perform the work. This description should indicate whether or not each particular piece of equipment/hardware will be included as part of a deliverable item under the resulting award. Also, this description should identify the component, nomenclature, and configuration of the equipment/hardware that it proposes to purchase for this effort. It is the Government's desire to have the contractors purchase the equipment/hardware for deliverable items under their contract. The purchase on a direct reimbursement basis of special test equipment or other equipment that is not included in a deliverable item will be evaluated for allowability on a case-by-case basis. Maximum use of Government integration, test, and experiment facilities is encouraged in each of the Offeror's proposals.

Government research facilities and operational military units are available and should be considered as potential government furnished equipment/facilities. These facilities and resources are of high value and some are in constant demand by multiple programs. It is unlikely that all facilities would be used for the Compact Power Conversion Technologies Future Naval Capabilities (FNC) Enabling Capability Project. The use of these facilities and resources will be negotiated as the program unfolds. Offerors should explain which of these facilities they recommend.

### **2. BAA Question and Answer Period**

During the solicitation period, potential responders may ask questions pertaining to this BAA. They should be forwarded via email to the Business Point of Contact identified in section I.7. Questions concerning the BAA must be received before 3 March 2008, 2:00 p.m. Eastern time in order to receive a response. Questions received after this time may not be answered. All questions received and their respective answers will be posted via an amendment to the BAA so that all potential bidders can benefit from the information posted.

### **3. Security Classification**

In order to facilitate intra-program collaboration and technology transfer, the Government will attempt to enable technology developers to work at the unclassified level to the maximum extent possible. If access to classified material will be required at any point during performance, the Offeror must clearly identify such need prominently in its proposal.

### **4. Project Meetings & Reviews**

Program status reviews may also be held to provide a forum for reviews of the latest results from experiments and any other incremental progress towards the major

demonstrations. These meetings will be held at various sites throughout the country. For costing purposes, Offerors should assume that 40% of these meetings will be at or near ONR, Arlington, VA, and 60% at other contractor or Government facilities. Interim meetings are likely, but these may be accomplished via video telephone conferences, telephone conferences, or via web-based collaboration tools.

## **5. Roles of the Navy Warfare Centers**

The Navy Warfare Centers will have the primary role for the integration and experimentation/demonstration process. They will also participate in the development of technologies where there are unique capabilities and facilities of interest to the Compact Power Conversion Technologies Future Naval Capabilities (FNC) Enabling Capability Project. They will also assist ONR in the management, engineering, and administrative tasks of the Project and will provide GFE and facilities that will be used for system-level integration and portions of experiment execution. In the area of management, these labs will support ONR in managing contract efforts, co-chairing with industry some of the Integrated Product Teams and Sub-Working Groups that will emerge, and working with the other participating Government agencies to assist in ease of access to necessary equipment and personnel. They will assist the technology developers from the business sector with respect to liaison with the acquisition program offices. In terms of engineering they will provide leadership as well as support to the integration effort and experiment efforts in terms of architecture definition, interface definition, scheduling, test planning, test execution and reporting. Administratively, they will track hardware procurement, allocation, and location. They will support ONR in tracking deliverables, cost, schedule, and risk. The Warfare Centers will also provide GFE and facilities where system-level integration and test will occur.

## **6. Department of Defense High Performance Computing Program**

The DoD High Performance Computing Program (HPCMP) furnishes the DoD S&T and DT&E communities with use-access to very powerful high performance computing systems. Awardees of ONR contracts, grants, and assistance instruments may be eligible to use HPCMP assets in support of their funded activities if ONR Program Officer approval is obtained and if security/screening requirements are favorably completed. Additional information and an application may be found at <http://www.hpcmo.hpc.mil/>.